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ABSTRACT

This study used longitudinal data from the Infant Health and Development Program (IHDP) to examine three issues regarding effects of economic deprivation on child development: (1) the effects on children's developmental outcomes of poverty and such poverty correlates as single parenthood, ethnicity, and maternal education; (2) the developmental consequences of the duration and timing of family economic deprivation; and (3) the comparative influence of economic deprivation at the family and neighborhood level. The IHDP was an eight-site clinical trial that tested the efficacy of educational and family-support services and high quality pediatric follow-up in the first 3 years of life in reducing the incidence of developmental delay in low-birthweight, preterm infants. Analysis of data showed that family income and poverty status were powerful correlates of children's cognitive development and behavior. Although the duration of poverty was a significant factor, its timing in early childhood was not. Five-year-olds' IQs were higher in neighborhoods with greater concentrations of affluent neighbors, while the prevalence of low-income neighbors appeared to increase the incidence of externalizing behavior problems. (Contains 104 references.) (MM)

Economic Deprivation and Early-Childhood Development[1]

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Abstract

We consider three questions regarding the effects of economic deprivation on child development. First, how are developmental outcomes in childhood affected by poverty and such poverty correlates as single parenthood, ethnicity and maternal education? Second, what are the developmental consequences of the duration and timing of family economic deprivation? And third, what is the comparative influence of economic deprivation at the family and neighborhood level? We investigate these issues with longitudinal data from the Infant Health and Development Program. We find that family income and poverty status are powerful correlates of the cognitive development and behavior of children, even after accounting for other differences -- in particular family structure and maternal schooling -- between low- and high-income families. While the duration of poverty matters, its timing in early childhood does not. Age-5 IQs are found to be higher in neighborhoods with greater concentrations of affluent neighbors, while the prevalence of low-income neighbors appears to increase the incidence of externalizing behavior problems.

Economic Deprivation and Early-Childhood Development

The U.S. Census Bureau's measurement of poverty in the United States in 1991 revealed that 21.8% of American children -- some 14.3 million in all -- lived in families in which total income failed to exceed even the spartan thresholds (e.g., $13,924 for a family of four) used to define poverty (U.S. Bureau of the Census, 1992, Table 3). Although somewhat lower than in the early years of the Reagan administration, the U.S. child poverty rate in 1990 was one-third higher than it had been two decades before, and it was much higher in the mid-1980s than the child poverty rate in Canada or Western Europe (Smeeding & Rainwater, in press; Smeeding & Torrey, 1988).[2]

What implications do these alarming poverty figures have for America's children? There is little doubt that children raised in poverty have less enjoyable childhoods. But to what extent does poverty affect developmental outcomes and thereby reduce opportunities for success and happiness in adulthood? In contrast with the apparent precision with which poor children are counted, the effects of economic deprivation on children are not at all well understood. There are several reasons for this.

First and foremost, past work linking economic disadvantage and child development has not generally incorporated careful measurement of economic deprivation. Parental incomes are neither reported reliably by adolescents nor recalled reliably in retrospective studies. With a few notable exceptions (e.g., Children of the National Longitudinal Study of

Youth; Chase-Lansdale, Mott, Brooks-Gunn, & Phillips, 1991), prospective developmental studies that interview parents do not include measurement of family income. As a consequence, research linking poverty with developmental outcomes has either relied on measurement of "socioeconomic status" or "social class", usually taken to be some combination of parental schooling and occupational attainments (Featherman & Hauser, 1987; Parker, Greer, & Zuckerman, 1988), or has focused on the events -- e.g., unemployment (Elder, 1974; McLoyd, 1990), income loss (Conger et al., 1992; Elder, Liker, & Cross, 1984) and female headship (Sandefur, McLanahan, & Wojtkiewicz, 1992) -- associated with the onset of economic deprivation.

Income and social class are far from synonymous. Since family incomes are surprisingly volatile (Duncan, 1988; Duncan, Smeeding, & Rodgers, in press), there are only modest correlations between economic deprivation and typical measures of socioeconomic background.[3] Accordingly, it is possible to distinguish statistically between the effects on child development of income poverty and those of its correlated events and conditions (Hill & Duncan, 1987; Sameroff, Seifer, Barocas, Zax, & Greenspan, 1987; Sewell & Hauser, 1975).

Surely such a distinction is important, both conceptually (Chase-Lansdale & Brooks-Gunn, in press; McCormick & Brooks-Gunn, 1989) and because family income is much more amenable to policy manipulation (e.g., adjusting the levels of welfare-program benefits, tax credits or the minimum wage) than are such correlates of poverty as low levels of schooling, lone-parent family structure or unemployment. Put another way: Census Bureau data show that it would have taken $37.2 billion in 1991 to eliminate poverty among

children, that is, to give all poor families with children an income equal to the poverty line (U.S. Bureau of the Census, 1992, Table 22). To what extent would developmental problems associated with disadvantaged families be eliminated by such an income transfer?

A second and related reason for the dearth of knowledge that would allow us to link developmental outcomes to economic deprivation is that there is an important and often neglected temporal dimension to poverty. Studies of the patterns of childhood poverty show great diversity, with much poverty being short-term but a troubling amount (especially among black children) lasting for most of childhood (Duncan & Rodgers, 1988). This raises questions about the sensitivity of developmental outcomes to both the duration and the timing of poverty (Corcoran, Gordon, Laren, & Solon, 1992; Furstenberg, Brooks-Gunn & Morgan, 1987; Haveman, Wolfe, & Spaulding, 1991).

With respect to duration, it is likely that being poor for relatively short periods is less detrimental to children than are sustained bouts of poverty. At the same time, if families move above the poverty line, but not very far above it, then duration of poverty might make little difference since income has not risen enough to enable families to make the changes--e.g., moving to a better neighborhood, purchasing high-quality childcare, investing in a beneficial home-learning environment--that would produce measurable improvements in their children's development. Evidence that duration does matter is shown in Corcoran et al. (1992), who find that the number of years adolescents lived in families with incomes below the poverty line was a highly significant predictor of school attainment and early career outcomes even after controlling for average level of family income.

The timing of poverty is also likely to influence development, although different

studies of the effects of timing have produced contradictory results. In a twenty-year prospective study of over 300 urban black families in which a teenage birth had occurred in the late 1960s, receiving AFDC in the young childhood years had more of an effect on educational attainment (grade failure and literacy at age 19) than did welfare receipt in the young adolescent years (Baydar, Brooks-Gunn, & Furstenberg, in press; Furstenberg et al., 1987). These same studies showed that family welfare status during the adolescent years was highly predictive of teenage pregnancy, although it was not associated with levels of academic functioning and achievement (Brooks-Gunn, Guo, Furstenberg, & Baydar in press; Furstenberg, Levine, & Brooks-Gunn, 1990). Haveman et al. (1991) use nationally-representative data spanning 20 years and find that the combination of poverty and welfare use between ages 12 and 15 is a significant predictor of high-school dropout status, whereas combined poverty and welfare use at earlier periods in childhood is not. A final illustration centers on the effects of economic hardship during the Great Depression. Using the Berkeley and Oakland Growth Studies, Elder (1974) demonstrated that young children and young adolescents were differentially affected by the onset of poverty due to fathers' unemployment.

A third obstacle to understanding how poverty affects development is that poverty has important ecological dimensions (McLloyd & Wilson, 1991). One issue is how household income is actually distributed among family members. Based as it is on household income, the official definition of poverty presumes that household members pool their incomes and spend them for the good of all family members. Little is known about how household income is actually spent (Lazear & Michael, 1988) and about the extent of help--both actual

and potential--available from family members living elsewhere (Stack, 1974).

Important extra-familial ecological dimensions include the neighborhood in which a family resides, childcare settings, schools, and peer groups (Flanagan, 1990; Levin, 1991; Mayer & Jencks, 1989; Phillips, 1991; Slaughter, 1988). Of particular concern are the economic resources of the neighborhood in which the family lives. The importance of neighborhood contexts is argued persuasively by Wilson (1987; 1991a,b), who presents an analysis of how structural changes in post-industrial society have contributed to an increase in the number of poor and jobless people in inner-city neighborhoods and how these changes have affected the behavior of residents of these impoverished neighborhoods.

Several different mechanisms for how neighborhoods influence individuals have been proposed (Crane, 1991; Jencks & Peterson, 1991; Mayer & Jencks, 1989; Wilson, 1987, 1991a,b). These include: (a) "neighborhood resource" explanations, based on the beneficial effects of higher-quality public (e.g., schools, parks, police protection) and private (e.g., scouts, sports) services; (b) "contagion" theories, based primarily on the power of peer influences to spread problem behavior; (c) theories of "collective socialization," in which neighborhood role models and monitoring are important ingredients in a child's socialization; (d) "competition" theories, in which neighbors (including classmates) compete for scarce neighborhood resources; and (e) theories of "relative deprivation," in which individuals evaluate their situation or relative standing vis-a-vis their neighbors (or classmates). The first three theories predict that affluent neighbors will confer benefits on children, especially low-income children, while competitive and relative deprivation theories lead to the opposite prediction. Thus, neighborhood-level economic deprivation may affect child development in

ways that are independent of or interactive with family-level deprivation.

This article considers, as a lens on economic deprivation and children's development, the following four issues: (a) the incidence of short and longer-run poverty among children at both the family and neighborhood level; (b) the relative influence on development in early childhood of income poverty and such poverty "co-factors" as single parenthood, ethnicity, maternal education; (c) the developmental effects of the duration and timing of family economic deprivation; and (d) the comparative influence of economic deprivation at the family and neighborhood level.

We first use unique longitudinal data from a national sample of children (the Panel Study of Income Dynamics) to describe multi-year patterns of the prevalence of family and neighborhood poverty. We then examine links between economic deprivation and children's development using longitudinal data from a multi-site developmental study of nearly 900 low-birthweight premature young children (the Infant Health and Development Program). We use these data to examine the relative influence of familial economic deprivation and other family characteristics, of timing and duration, and of neighborhood and family poverty upon developmental outcomes at age 5. Outcomes include cognition and behavior, as measured by IQ tests and behavior problem checklists, respectively. Family income was measured over a four-year period, enabling us to look at duration and timing of poverty.

Method

Panel Study of Income Dynamics

Design and Sample

National patterns of family- and neighborhood-level poverty are described with representative data from the Panel Study of Income Dynamics, an ongoing longitudinal survey of U.S. households begun in 1968 by the Survey Research Center of the University of Michigan (Hill, 1992). Low-income families were initially oversampled, but weights have been developed and are used in this article to adjust for both the differential initial sampling probabilities and for differential nonresponse that has arisen since the beginning of the study.[4] Our analysis of the incidence of patterns of family- and neighborhood-level poverty between 1979 and 1984 is based on a sample of 568 black and 796 white children age 0-3 in 1980.

Infant Health and Development Program

Design and Sample

Our primary data set is the Infant Health and Development Program (IHDP), an eight-site randomized clinical trial to test the efficacy of educational and family-support services and high-quality pediatric follow-up offered in the first three years of life in reducing the incidence of developmental delay in low-birthweight (LBW), preterm infants (Infant Health and Development Program, 1990). Infants weighing no more than 2500 grams at birth were screened for eligibility if they were 40 weeks post-conceptional age between January 7, 1985 and October 9, 1985 and were born in one of eight participating medical institutions (Arkansas at Little Rock, Einstein, Harvard, Miami, Pennsylvania, Texas at Dallas, Washington and Yale). Of the 1,302 infants who met enrollment criteria, 274 (21.0%) were eliminated because consent was refused and 43 were withdrawn before entry into their assigned group.[5] Attrition in the remaining sample was low--12% at the 60-month

assessment.

Our analysis of these data focuses on the cases within the eight sites for which addresses could be matched to a Census neighborhood identifier, producing an analysis sample of 895, of whom 489 (54.7%) were black, 101 (11.3%) Hispanic and 304 (34.0%) non-Hispanic white.[6] Six of the centers (Einstein, Harvard, Miami, Pennsylvania, Seattle and Texas at Dallas) were located in large metropolitan areas with large populations of poor families, and two were located in metropolitan areas (Arkansas and Yale) serving both urban and rural communities.

The IHDP research design included stratification by clinical site and into birthweight groups. One-third of the infants were randomized to the intervention group and two-thirds to the follow-up group. The intervention program was initiated on discharge from the neonatal nursery and continued until 36 months. The services for infants in the intervention group consisted of home visits over the three years, an educational child-care program at a child-development center in the second and third years, and bimonthly parent-group meetings in the child's second and third years of life (Brooks-Gunn, Klebanov, Liaw, & Spiker, in press; Ramey, Bryant, Wasik, Sparling, Fendt, & LaVange, 1992).

Measures

Developmental outcomes. The IHDP was designed to show whether the children in the intervention group differed from those in the follow-up group in cognitive functioning, behavioral competence, and health status (Infant Health and Development Program, 1990; McCormick, Brooks-Gunn, Shapiro, Benasich, Black, & Gross, 1991).[7] Our measure of cognitive functioning at age 5 is the Wechsler Preschool and Primary Scale of Intelligence

(WPPSI; Wechsler, 1967), a test developed for use with children between the ages of 4 and 6 1/2 years. The reliability of the three measures of IQ--verbal IQ, performance IQ, and full scale IQ--range from 0.93 to 0.96 (Sattler, 1982). Behavioral functioning is measured by the Revised Child Behavior Profile (Ages 4 & 5; Achenbach & Edelbrock, 1984). The CBP/4-5 is a 120-item questionnaire that measures behavioral competence. Mothers characterize statements about their child as not true (0), often or very true (2) for behavior within the past six months. Two broad factors--internalizing (e.g., too fearful or anxious; unhappy, sad or depressed) and externalizing (destroys his/her own things; temper tantrums or hot temper)--have been identified through factor analysis and are distinguished in our empirical analysis. Higher scores on the WPPSI indicate higher IQ; higher scores on the Achenbach Behavior Problems indexes indicate more behavior problems.

Neighborhood conditions. Neighborhood conditions in the IHDP and PSID were constructed by matching family addresses to a 1980 Census neighborhood identifier. In the case of the IHDP, the relevant address was taken at the time of randomization, when the infant was 40 weeks of age. In the PSID, the addresses were those at which the children lived between 1980 and 1985. Where possible and in the vast majority of cases we took the Census tract to be the neighborhood.[8]

Wilson's work has focused on the possible social isolation inherent in neighborhoods with particularly high concentrations of poor people. Neighborhoods with poverty rates of 40% or more are often termed "ghetto" neighborhoods (Jargowsky & Bane, 1990; Wacquant & Wilson 1989; Wilson 1991a,b). Thus one measure of neighborhood poverty we use is the fraction of the neighborhood's nonelderly population who were poor. Because concentrations

of poor and affluent neighbors may have distinct influences on developmental outcomes (Mayer and Jencks, 1989), we also employ a more complete characterization of the neighborhood's income distribution, using two indicators: the fraction of families in the tract with incomes under $10,000 ("low income") and the fraction of families with incomes over $30,000 ("affluent").[9]

Family-level poverty. The measurement of "official" U.S. poverty is based on a set of income thresholds that were developed in the 1960s and are adjusted each year for changes in the cost of living using the Consumer Price Index.[10] In 1991, U.S. poverty thresholds for families of three, four and five persons were $10,860, $13,924 and $16,460, respectively. Families with annual cash incomes, before taxes, that exceed these thresholds are considered "not poor," while families with income falling below them are "poor." The PSID gathers very detailed annual income data from its families. The IHDP asked its respondents to provide an estimate of total family income in a series of categories. We converted the categorical responses into a continuous measure by assigning the midpoints of each interval.[11] Both studies gathered sufficient information on family size to calculate a poverty threshold for each family each year.

In some of our analyses we measure household economic status by dividing each household's income by its corresponding poverty threshold and call the resulting quotient the "family income-to-needs ratio" or just "income to needs." In 1991, children (as well as other family members) living in a four-person household whose income totaled $41,772 would have income-to-needs ratios of 3.0 (=$41,772/$13,924) and be considered nonpoor in that year; members of four-person households with a total household income of only $6,962

would each have an income-to-needs ratio of 0.5 and be designated as poor. By definition, an income-to-needs ratio of 1.0 indicates that a family income is equal to the poverty threshold.

Measurement of income and poverty status during each year in the six-year period between 1979 and 1984 in the PSID provides data for a variety of multi-year poverty measures (Duncan and Rodgers, 1991). Our PSID analysis simply counts the number of years in which the child lived in a household with income below the poverty line. In the IHDP, the measures of long-term economic status are based on the ratio of family income to needs averaged over the four calendar years prior to interviews taken when the children were 12, 24, 36 and 48 months old.

The duration of poverty in the IHDP was measured by two dummy variables: (a) whether the family was poor some but not all of the time (i.e., whether family income to needs was less than one in 1, 2 or 3 of the 4 reports); and (b) whether the family was poor all of the time (i.e., family income to needs was less than one all four years). Never-poor families are the excluded group in the regressions, so coefficients on the two poverty measures indicate regression-adjusted IQ and behavior problem differences between children growing up in the two kinds of poor families and children raised in never-poor families.

Other family-level measures. Other family-level measures in the IHDP analyses include: the birth weight and the gender of the child, the completed schooling of the mother, in years; whether the family was headed by the mother; whether the mother was black and whether the family was in the treatment group. The child's birth weight and gender were recorded at birth, mother's education and race were measured when the infant was 40 weeks

old; and the female-headship and martial status of the mother were measured when the child was 24, 36, 48 and 60 months old.[12] Following Sandefur, McLanahan and Wojtkiewicz (1992), we characterized female headship with a set of dummy variables combining the female-headship and marital status of the mother at these four times: (a) female head all of the time and never-married at 60 months; (b) female head all of the time and divorced, widowed or separated at 60 months; (c) female head at 24 months but not at 60 months; (d) not a female head at 24 months but a female head at 60 months; (e) never a female-head; and (f) all other combinations.

Family-level intervening measures. The preschool version (ages 3-6) of the Home Observation for Measurement of the Environment (HOME; Bradley & Caldwell, 1984) is a 55 item semi-structured observation interview. The HOME was administered when the child was 36 months of age (corrected for prematurity) as a measure of the child's level of stimulation in the home environment. Three subscales were used here: provision of learning stimulation, which is a composite of the learning, academic, and language stimulation and variety in experience subscales (e.g., child has toys which teach color, size, shape, child is encouraged to learn the alphabet and numbers); alpha= .87 for 32 items; physical environment (outside play environment appears safe, interior of apartment not dark or perceptually monotonous); alpha= .74 for 7 items; and warmth (parent caresses, kisses, or cuddles child during visit); alpha= .64 for 7 items. Reliability coefficients are based only on the follow-up subjects.

The Health and Daily Living Form Revised Version (Moos, Cronkite, Billings, & Finney, 1986) is a 32-item self-report coping scale, developed for use with clinical

populations and adolescents. Nine types of coping responses are classified into three domains according to their method of coping: (a) active cognitive coping, (b) active behavioral coping, and (c) avoidance coping. Respondents indicate a recent stressful event and rate the frequency with which they use 32 coping responses using a scale from 0 (No) to 3 (Yes, Fairly often). The reliability of this measure ranges from .60 to .74 for non-clinical adult populations, with the highest reliability for active behavioral coping (e.g., talked with a friend about a problem, made a plan of action and followed it). In the present analysis we focus on the most active form of coping, behavioral coping.

The General Health Questionnaire (Goldberg, 1978) taps depression, somatization and anxiety dimensions. The relatively high stability of adult depression (Kandel & Davies, 1986) and the evidence linking depressive symptoms to children's well-being in a causal fashion (Richters & Pellegrini, 1989), provides the rationale for including this construct as a mediator. A total score based on recoding the responses to values from 0 to 3 (See Goldberg, 1972) results in a total score from 0 to 36. The 12-item version of the GHQ was used.

Social Support was assessed using six vignettes adapted from Cohen & Lazarus (1977) at 36 months. These vignettes, pretested and used in the Central Harlem Study, have good discriminant validity (McCormick et al., 1987; McCormick, Brooks-Gunn, Shorter, Holmes, & Heagarty, 1989). For each vignette, whether help can be expected from people living within the household and from those outside the household is determined by Yes (1), No(0) responses. Scores range from 0 to 12. A variety of situations are presented: whether support is available if the respondent needs to go out unexpectedly, is laid up for three

months with a broken leg, needs help making an important decision, has a serious personal problem, needs to borrow money in an emergency, or has someone with whom to enjoy a free afternoon. The type and amount of social support is believed to mediate the association between family life events/socioeconomic stressors and parent-child interaction patterns (Elardo, Bradley, & Caldwell, 1975; Hall, Williams, & Greenberg, 1985; Honig & Gordner, 1985).

Descriptive Characteristics of the Samples

Descriptive statistics for the IHDP, both for the total sample and for Black and non-Black subsamples, are presented in Table 1. The average schooling level of mothers was about 12 years. One-quarter of the sample children lived in female-headed families all the time and an additional third lived in such families part of the time. The average family incomes of the children were 77% higher than the poverty line; one in five lived in families that were poor throughout the period in question. The neighborhoods in which the children lived contained about twice as many low-income families, on average, as high-income families.

Insert Table 1 About Here

A comparison of the subsamples shows large racial differences in all of the demographic and economic measures. A comparison of the IHDP and the nationally-representative PSID sample (with some of the data presented below) shows that black mothers in the IHDP lived in somewhat lower-income neighborhoods, on average, than

blacks in the PSID; the family incomes and rates of female headship in the IHDP show the lower average socioeconomic position of families in the IHDP.

Results

National Patterns of Family- and Neighborhood-level Poverty

The PSID is the only longitudinal national sample of children to have compiled data on poverty at both the family and neighborhood level. In using these data to describe six-year patterns of family- and neighborhood-level poverty, we measure family-level poverty by the number of years out of six in which the child's family income was below the poverty line. Neighborhood-level poverty is measured by the average fraction of nonelderly neighbors with incomes below the poverty line.[13] The distribution of the sample across these family- and neighborhood-level poverty measures is shown in Table 2. Data are presented separately by race, with results for whites (really all races other than "black") in the top panel and blacks in the bottom.

Insert Table 2 About Here

A comparison of row totals shows vast differences in the family poverty experiences of whites and blacks. Roughly three-quarters of the white children never lived in poor families; only one-third of blacks escaped poverty altogether. Poverty experiences are temporary for many more whites than blacks. Among ever-poor whites children, only one in five (5.6/(5.6+20.2)) was poor in five or six years. Among ever-poor blacks, more than

one-half were poor all the time. Across the whole samples, only one white in 20 was poor in at least five of the six years; nearly 40% of black children were poor that long.

A common criticism of poverty measurement at the family level is that families with incomes just a few dollars above the poverty line are accorded the same "nonpoor" status as affluent families. Perhaps the apparent income mobility of individuals poor in some but not all seven years is just an artifact of the dichotomous nature of the poverty classification. To investigate this, we averaged the family incomes of the "part-time" poor--children poor in less than five of the six years--over the years in which their incomes were above the poverty line (data not shown in Table 2). Consistent with research showing that poverty spells often follow dramatic income losses (Burkhauser & Duncan, 1988), the average incomes of these children were nearly three times higher than the poverty line during their years out of poverty. The occasionally-poor blacks were worse off than their white counterparts, but even so, more than two thirds of the blacks poor 1 to 4 years had incomes more than twice as high as the poverty line during their nonpoor years.

The column totals of Table 2 show stark ethnic differences in neighborhood-level poverty. More than three-fifths of white but only one in ten black children lived in neighborhoods with few (i.e. less than 10%) poor neighbors. Using neighborhood poverty rates in excess of 40% to define "ghetto" neighborhoods, the incidence of ghetto poverty among blacks is more than twenty times as high as it is for whites; however, it is also important to note that the fraction of black children living in ghetto neighborhoods is only 8.4%.

The interior of Table 2 shows that nearly half of the blacks but less than one in ten

whites who escape poverty at the family level encounter it (in rates in excess of 20%) in their neighborhoods. The majority of white but only about one in twenty black children escape both family- and neighborhood-level poverty.

Analytic Plan for Developmental Outcomes at Age 5

Ordinary least squares (OLS) multiple linear regressions were first conducted on IHDP data with age-5 IQ and the two behavior problem indexes as dependent variables and the following family-level measures as independent variables: site (dummy coded with each site being compared with the eighth site; results available upon request), treatment group status (dummy coded), birth weight (in grams), child's gender (1=male, 0=female), ethnicity (black=1, nonblack=0), mother's education (in years), and the five female headship dummy variables that involved female headship at least part of the time. Female headship none of the time was omitted from the regression as a control. The coefficients for each variable in these and all other regressions were estimated in the presence of controls for all other independent variables included in the given regression analysis.

We next ran a series of regressions that added to these background measures alternative characterizations of family income and poverty. Thus, our estimated effects of family income and poverty patterns are also adjusted for differences in the sociodemographic characteristics of the family. We then present estimates of the impact of neighborhood income distribution, net of the sociodemographic and economic characteristics of the family. Finally, we add the HOME, social support, depression and coping measures to assess the mediating role played by these maternal characteristics.

Family Income and Poverty

Regression results relating age-5 IQ to family and neighborhood characteristics are shown in Table 3. Results from comparable regressions using age-5 internalizing and externalizing behavior problems are presented in Tables 4 and 5, respectively. The first entry in the regression column is the unstandardized regression coefficient; the second (in parentheses) is the standard error associated with that coefficient; and the third (in brackets) is the standardized coefficient.

Insert Tables 3, 4 and 5 About Here

Consistent with most past research, the first column of Tables 3-5 shows that family-level measures other than income have a number of similar effects on the three developmental outcomes, although they account for much more of the variance of IQ than of either internalizing or externalizing problem behavior. Mother's schooling has a highly-significant beneficial association with all three outcomes, whereas living arrangements in which a female head is present all of the time or at least at the time of the 60-month measurement have significant detrimental effects. Before adjustment for family-income differences, children living with never-married mothers all of the time have 5-point lower IQs (i.e., one third of a standard deviation), and 4-point higher internalizing and 3-point higher externalizing scores on the behavior-problem index than children in families in which there was never a female head.

Birthweight is a significant predictor of IQ but not behavior problems (Brooks-Gunn, Klebanov, Liaw, & Spiker, in press; McDonald, Sigman, & Ungerer, 1989). The gender of

the child is significant for externalizing behavior problems (girls are reported by their mothers to have fewer problems than boys) but for neither internalizing behavior problems nor for IQ (See Benasich, Brooks-Gunn, & McCormick, in press, for a review; Achenbach & Edelbrock, 1981; Chazan & Jackson, 1971, 1974; Jenkins, Bax, & Hart, 1980; MacFarlane, Allen, & Honzik, 1962). Blacks score lower on the IQ test but have fewer reported behavior problems. Ethnic differences will be discussed in greater detail below.

As measured by four-year average family income to needs, family economic status is a powerful predictor of all three outcomes (column 2). Its inclusion in the IQ regression increases the adjusted R-squared by .05. Its incremental R-squared in the behavior-problem regressions is not as large.

For all three outcomes, the coefficient on average income to needs is highly significant in a statistical sense (respective t-ratios are 7.6, 3.0 and 3.3 in the IQ, internalizing and externalizing regressions). An increment in income to needs of one unit (e.g., increasing average family income from the poverty line to twice the poverty line) is associated with a 3.6-point increase in IQ and a 1-point drop in each of the behavior problem subscales.

Beyond their importance in explaining variation in IQ, differences in family economic status also account for most of the apparent detrimental effects of female headship (compare the coefficients on the female-headship variables in columns 1 and 2 of Table 3.) Economic differences explain much less of the female-headship effects on behavior problems.

Treating family income to needs as a continuous variable presumes that the beneficial effects of family-size-adjusted income on IQ and behavior problems are identical for poor

and affluent families. To focus directly on poverty, we characterized the family-income histories of IHDP-sample children according to whether they were poor all of the time, some of the time or, as represented by the omitted group, on none of the four occasions when income was measured. Results presented in column 3 of Tables 3-5 show that degree of poverty persistence matters: after adjustment for other family-level measures and when they are compared with never-poor children, children in persistently poor families have 9.1-point lower IQs (i.e., three fifths of a standard deviation), 4.0-point worse scores on the internalizing behavior problem index and 3.3-point worse scores on the externalizing behavior problem index. Occasional poverty is also associated with significiantly worse developmental outcomes (for externalizing behavior problems the relevant coefficient is significant at only the .10 level), although the estimated effect of transitory poverty is not as large as the estimated effect of persistent poverty. As indicated by the adjusted R-squares in the second and third columns, poverty patterns were generally less powerful than was the continuous income-to-needs measure in accounting for differences in IQ and behavior problems.[14]

Whether the timing of poverty mattered was explored in supplemental regressions not reported in Tables 3-5. We considered poverty status, average income-to-needs ratio of less than 1.0, during either 12 or 24 months as being poor "early," and poverty status during either 36 or 48 months as being poor "late." We then substituted for the poverty measures in column 3 three dummy variables indicating whether the child was poor: (a) both early and late; (b) early but not late; and (c) late but not early, with the never-poor again serving as the omitted control. Timing proved to be unimportant: for all three outcomes there were highly

significant detrimental effects of being poor both early and late, and smaller and approximately equal effects of being poor only part of the time.

Neighborhood Income and Poverty

Whether neighborhood economic conditions add to the family-based explanation of differences in IQ and behavior problems was investigated by adding Census-based neighborhood measures into the regression. The inclusion of a measure of affluent neighbors proved important for IQ, while the measure of low-income neighbors was a significant predictor of externalizing behavior problems (column 4 of Tables 3 and 5, respectively). Including both the low-income and affluent neighborhood measures in a single regression produces coefficients that reflect the effects of additional low-income or affluent neighbors relative to the omitted category of moderate-income neighbors and thus distinguishes between the effects of the presence of low-income neighbors and those of the absence of affluent neighbors. The results suggest that having more affluent neighbors is associated with higher IQs, while having more low-income neighbors is associated with more externalizing problem behavior. Note, however, that the explanatory power of these neighborhood-based measures of economic resources was considerably smaller than the family-based measures reported earlier. Additional regressions (not shown in Table 3) show that the benefits of affluent neighbors for IQ were not significantly different for children in poor and nonpoor families.

Maternal Mediators

More complete models of the effects of socioeconomic factors on development should include mediators such as the amount and quality of time spent by parents with their children (Stafford, 1987), other aspects of the home-learning environment as well as the emotional

and mental health of the parents. In the IHDP, we are able to include measures of the HOME environment, coping, social support and depression in the IQ and behavior problem regressions (column 5).

Consistent with other work (Bradley et al., 1989; Clarke-Stewart, & Apfel, 1978; Gottfried, 1984; Wachs & Gruen, 1982), the HOME learning scale is a highly significant predictor of IQ. More relevant to the focus of this paper is the fact that HOME and other mediators accounts for about one third of the effect of family income on age-5 IQ. In the case of (mother-reported) internalizing behavior problems, the mother-reported depression and coping scales proved significant mediators, accounting for about half of the effect of family income. In the case of externalizing behavior problems, these two mediators plus the HOME learning subscale were significant, and collectively accounted for half of the effect of family income as well. These results are consistent with research that has associated maternal mental health with child behavior problems and depression (Bakeman & Brown, 1980; Richters & Pellegrini, 1989; Sameroff & Seifer, 1983).

A Simple Change Model

One approach to causal modelling with longitudinal data is to estimate the effects of family income on change in developmental outcomes. Under certain conditions, change models can difference out the effects of persistent unobservables that might be correlated with family economic status (Rodgers, 1989). We experimented with such a change model by adding age-3 IQ and behavior problems to a version of the age-5 regression models that included site, treatment status, gender, maternal schooling, female headship at 36 and 48 months and average income to needs reported in the 36- and 48-month interviews.

persistent poverty were roughly twice as large as the effects of transient poverty. In the case of age-5 behavior problems, the effects of persistent poverty were 60%-80% higher than the effects of transient poverty. These results suggest that effects of poverty are cumulative (Haveman et al, 1991; Parker et al, 1988).

Not only are there family-level income effects, but adjustments for family-income differences alter the associations between female headship and child outcomes. Before accounting for income differences, both continuous and transient female headship had significant negative associations with IQ scores. None of these effects retains its statistical significance once family income is entered into the equation. As the literature on school dropouts and achievement (Garfinkel & McLanahan, 1986; McLanahan, 1985; Willet & Singer, 1991) indicates, these findings suggest that the apparent effects of female headship on child cognition are due mostly to the lower family incomes of female-headed families.

A different pattern emerges for behavior problems, where persistent, never-married female headship as well as a change in family structure that ends up in a female-headship situation continues to exert an influence even after we adjust for differences in family income. The latter result suggests that undergoing a transition from a two- to a one-parent household is as likely to affect behavior in children as is living for an extended period in a one-parent family. Previous research also has documented the disruptive short term effect of the transition to a single-parent household for both parents and children (See Chase-Lansdale & Hetherington, 1990 for a recent review of the literature).

Neighborhood Conditions

Although decidedly less powerful than family-income differences, neighborhood

Consistent with a causal effect, average income to needs was still a highly significant predictor of age-5 IQ ($t=3.6$, $p< .001$) even after controlling for age-3 IQ (Table 6). The coefficient on average income to needs was insignificant in the internalizing behavior-problem regression and at the margin of significance ($t=1.96$, $p= .05$) for externalizing behavior problems.

Insert Table 6 About Here

Discussion

Many children and adolescents in the United States today experience poverty at least occasionally, and for blacks poverty is more the rule than the exception. Our concern in this article was whether these experiences leave measurable scars on cognitive or behavioral development by age 5. We were particularly interested in the contribution of income measures over and above other sociodemographic characteristics, since most developmental studies have not been able to obtain measures of income.

Family Economic Status

The analyses indicate that among the SES measures available in our data, family income is a far more powerful correlate of age-5 IQ than more conventional SES measures such as maternal education, ethnicity, and female headship. In the case of the two behavior problem indexes, family income was also the most powerful predictor but the margin was smaller. Our IQ regressions that included poverty patterns showed that the effects of

income differences were significant determinants of age-5 IQ and externalizing behavior. Residing in neighborhoods with more affluent neighbors raised IQ 1.6 points for each 10% increase in the proportion of affluent neighbors. In contrast, we found no negative effect of the proportion of poor neighbors on age-5 IQs. In the case of externalizing behavior, residing in neighborhoods with more low-income neighbors raised the externalizing behavior problem score by 0.6 points for each 10% increase in the proportion of low-income neighbors.

The fact that affluent but not poor neighbors had an influence on child IQ in our data suggests that neighborhood-resource and parental-role-model mechanisms rather than contagion may be at work. The number of poor neighbors may become more important for children as they enter school and, especially, reach adolescence. Since a poor neighborhood is more likely to be characterized by substantial numbers of peers who are using drugs, having early unprotected intercourse, and dropping out of school, the proportion of poor neighbors may well influence adolescent outcomes (Crane, 1991; Steinberg, 1987).

In contrast, externalizing problem behavior, as reported by mothers, was influenced by the percentage of poor individuals in the neighborhood. Whether mothers residing in neighborhoods with a large proportion of poor individuals perceive their children to be more externalizing or whether their children actually have more externalizing behaviors is not known. If the latter is true, the effect could be due to mothers in poor neighborhoods being less likely to socialize their children in ways that reduce aggressive and acting out behavior. Indeed, in neighborhoods perceived as dangerous, mothers may feel that it is adaptive to allow aggressive behavior, as children may need to defend themselves from others (Jarrett, 1992). Another mechanism might be the peer group, as has been reported for older children

(Crane, 1991; Steinberg, 1987). Over two-thirds of the IHDP children were in some form of school by the age-5 assessment. More externalizing behavior may be seen in poor neighborhoods, due to lower quality schools and child care environments, as represented by higher child-staff ratios (less adult supervision likely to lead to more acting out behavior) and/or less adult-child interaction (Hayes, Palmer, & Zaslow, 1990). Data to test these hypotheses are not available in the IHDP.

Racial Differences

Both the PSID and the IHDP samples make clear the striking and disturbing family and neighborhood income disparities between black and white families. Continuous poverty was the plight of about one-third of the black children in both samples. Black families are not only more likely to be poor, but also to live in poor neighborhoods. In the nationally representative PSID, nearly three-fifths of blacks lived in neighborhoods where at least one-fifth of the individuals were poor, compared to less than one-tenth of non-blacks. Comparable figures for so-called "ghetto" neighborhoods (where 40% of more of the individuals are below the poverty line) are 8.4% for blacks and 0.3% for non-blacks.

Family and neighborhood income differentials go a long way in accounting for the differences in IQ scores of black and white children.[15] In the IHDP sample, the IQ difference at age 5 is 10.7 points, controlling for site, treatment-group status, gender of child, and birthweight (regression results not shown in Table 3). The addition of maternal education and father presence, two of the sociodemographic variables often measured in developmental studies reduces the ethnic difference to 7.8 IQ points or about a half standard deviation (Table 3, column 1). Adjustments for racial differences in family income-to-needs

child development, to estimate causal effects.

An important extension of our work in this regard would be the estimation of a more complete model of the ways in which income produces developmental differences. One obvious consideration is that poverty measurement (the "income-to-needs ratio" in our analysis) combines the possible effects of income and family size. We ran unreported IQ regressions that included (along with the sociodemographic measures) four-year average income and family size as separate regressors. Although both were highly significant predictors, average family income had a much larger effect than family size on age-5 IQ ($t = 7.5$ and 3.7, respectively). For age-5 behavior problems, family size had virtually no explanatory power ($t < 1$ for both subscales), while family income carried all of the explanatory power observed in Tables 4 and 5 ($t > 3.0$ for both subscales).

Another concern in testing causal models is with the representativeness of the IHDP data. Children in the IHDP sample were low-birthweight, premature infants clustered in eight sites. Whether similar results would be found for a national sample of normal-birthweight children is not known. We suspect that the findings would be similar, based on results from a large study of low- and normal-birthweight children who were age 8. Results from this study suggest that education, ethnicity, and female headship are associated similarly across the birthweight distribution (McCormick, et al, 1992). The unique virtue of the IHDP, of course, is that it is the only developmental data set that combines high-quality measurement of developmental outcomes with longitudinal data on family economic status and neighborhood conditions.

A final concern with the IHDP data is that the behavior-problem measure is reported

ratios over a 4-year period cuts the remaining gap by about 30%, to 5.4 points or about a third of a standard deviation (column 2). Adjustments for differences in neighborhood income are more modest -- the coefficient falls to 4.8 (column 4). Adjustments for differences in the HOME learning environment and other maternal mediators reduces the gap to 2.9 points or to about one-fifth of a standard deviation. These results suggest that not including family economic measures will overestimate ethnic differences in cognitive and probably school achievement outcomes.

In the IHDP sample, behavior problem scores were lower for the black children. Given that the simple association between ethnicity and Child Behavior Checklist scores was not significant (the bivariate regression coefficient on "Black" was -1.09 with a standard error of 0.70 for internalizing behavior and -0.85 with a standard error of 0.67 for externalizing behavior), we suspect that the finding is due to a suppressor effect. In fact, when a regression was run omitting the female-headship independent variables, the effect of ethnicity was not significant. This finding speaks to the importance of female headship in accounting for differences in children's reported behavior problems.

Are the Income Effects Causal?

The powerful effects of family income on IQ and behavior problems in the IHDP are consistent with but do not prove that ceteris paribus increases in the incomes of poor families would improve child outcomes. Unlike Salkind and Haskins (1982), who used a randomized experimental setting to find beneficial effects of increasing family income on developmental outcomes, we are forced to rely on the natural variation in the family incomes of sample families, coupled with regression-based controls for other socioeconomic determinants of

is scarring the development of our nation's children.

by the mother. Behavior-problem scores are but one aspect (and perhaps a very limited one) of socioemotional functioning (Sroufe, 1979), although they clearly have relevance for subsequent school and emotional functioning (Lerner, Inui, Trupin, & Douglas, 1985; Stevenson, Richman, & Graham, 1983; Velez, Johnson, & Cohen, 1989). However, maternal reports of behavior problems are associated (modestly) with actual behavior problems as rated by teachers, as well as with maternal mental health (Benasich, Brooks-Gunn, & McCormick, in press; Spiker, Kraemer, Constantine, & Bryant, 1992). IHDP data are currently being collected from teachers, when the children are 8 years of age, although no comparable data were available at age 5, as not all children were in school.

In sum, our data are consistent with the hypothesis that family income and poverty status are powerful determinants of the cognitive development and behavior of children, even after we account for other differences--in particular family structure and maternal schooling--between low- and high-income families. The omission of income measures from most developmental data will almost certainly lead to biases in the estimation of the effects of sociodemographic correlates of income. Moreover, the association between income and developmental outcomes appears to be mediated by maternal characteristics and behaviors. The learning environment of the home mediates the relationship between income and IQ, whereas maternal depression and coping mediate children's behavior problems. Thus, economic disadvantage not only has a tangible effect on children through the provision of educational resources available to them, but through the detrimental psychological effect it exerts on their parents. There is little doubt that child poverty, which is much higher in the United States than in other Western countries, as well as higher now than two decades ago,

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2. Defining poverty as family incomes below 50% of the income of the median family in the given country's population, Smeeding & Rainwater (in press) estimated the following rates of children's poverty: United States (1986)--23.7%; Canada (1987)--13.9%; West Germany (1984)--7.9%; Sweden (1987)--5.1%; United Kingdom (1986)--16.8; Netherlands (1987)--7.3; France (1984)--10.4%.

3. Duncan et al. (in press) found that nearly one-third of adults with low family incomes (less than $18,500) made transitions to middle-income status over a five-year period, while roughly one-quarter of high-income adults (more than $55,000) fell back into middle-income status.

4. By following all members of its sample over time, including children as they leave their parents' homes, the PSID maintains a representative sample of the nonimmigrant U.S. population and of major subgroups in the population--in our case, black and white

adolescents. Since there was no provision until 1990 for adding immigrants to the sample, relatively few Hispanics are included in the PSID sample of whites.

5. Reasons for exclusion include: living more than a 45-minute drive to center-based care (46.9%); hospital discharge before or after the recruitment period (13.3%); a gestational age of greater than 37 weeks (18.6%); or some other maternal or infant condition precluding participation in the intervention program (21.2%). In this last group, only 61 infants were excluded for health reasons, so this sample is not biased toward healthy LBW preterm infants.

6. One of the cases had missing data on ethnicity.

7. The developmental outcomes of LBW, preterm infants are somewhat worse than those of normal birthweight (NBW) infants (Institute of Medicine 1985; McCormick 1985, 1989). For example, almost twice as many LBW children have IQ scores under 85 (Dunn 1986; McCormick, Brooks-Gunn, Workman-Daniels, Turner, & Peckham 1992). Similar findings have been reported for behavior problems (McCormick, Gortmacker, & Sobal 1990). Differences between birth weight groups are largest when comparing infants with birth weights of less than 1000 grams with all other groups (McCormick et al., 1992). Even though the mean levels of outcomes such as IQ and behavior problems are lower for LBW infants, associations between family-level variables such as parental education and occupation and outcomes are similar for NBW and LBW infants (Dunn 1986; Drillien 1964; Gottfried 1984). This is true for socio-demographic characteristics: The correlations between such variables and outcome in our IHDP sample are similar to those reported for NBW samples with similar demographics (Brooks-Gunn, Klebanov, Liaw, & Spiker, in press). Based on these findings, we expect that the use of a LBW sample will not result in substantially different associations between neighborhood and family-level variables and child outcomes, as compared with a NBW sample with the same demographic characteristics.
However, it is possible that the birth of a LBW infant may affect the association between neighborhood level and intervening variables, although no extant data set allows for the examination of this possibility. We do know that a few intervening variables are associated with LBW, particularly in the first year of life. For example, mothers are somewhat less likely to place LBW than NBW infants in out-of-home child care in the first year of life, while by the second and third years, no differences are found (based on analyses of the NLSY by Mott & Baker 1989 and by Baydar & Brooks-Gunn, 1991). Maternal interaction patterns differ somewhat by child's birthweight, again in the first year (Field 1979, 1987; Friedman & Sigman, in press). Such differences may place LBW children at greater risk for poor developmental outcomes than NBW children (Sameroff & Chandler, 1975; Parker et al., 1988), although little data exist from large samples across the birth weight spectrum to test this hypothesis. However, caution should be taken in generalizing these results to NBW samples, especially with respect to the analyses of intervening variables.

8. Details on our geocoding procedures are available on request. Census tracts usually consist of between 4,000 and 6,000 individuals and are defined with the advice of local committees to approximate "real" neighborhoods.

9. 1980 Census data show that about one-quarter of families had incomes above $30,000, while about one-fifth had incomes below $10,000.

10. The poverty thresholds are not adjusted for real (i.e., above inflation) improvements in living standards, so the poverty line is a smaller fraction of median income now than it was twenty years ago.

11. The categories, in thousands of dollars, were: <5, 5-7.49, 7.5-9.9, 10-14.9, 15-19.9, 20-24.9, 25-34.9, 35-49.9, >50. We assigned a value of 3.5 to respondents in the first category and 65 to respondents in the last category. The midpoint of the range was assigned to all other categories.

12. We would have liked to have included data on female headship and marital status at randomization and at 12 months but they were not available in the IHDP. Also, questions on marital status were not consistently asked between 24 and 60 months, precluding an exact replication of the coding of Sandefur et al. (1992).

13. Not all addresses could be matched to Census geocodes. In instances where fewer than six matches were obtained, we averaged poverty over the number of years of available neighborhood data.

14. In analyses not presented here, we explored the issue of nonlinear effects of family income by comparing IQ and behavior-problem scores of children in families with 4-year average income-to-needs ratios of: (a) less than one; and (b) more than three, with the omitted group with ratios between 1 and 3. In the case of IQ and externalizing behavior problems, both coefficients were significant and virtually equal (and opposite in sign), indicating that the positive effect of affluence is just as strong as the negative effect of poverty. In contrast, a threshold effect was found for internalizing behavior problems; poor children had significantly higher scores than did the middle-income group but children in affluent families were not reported to be significantly less problematic than children in the middle-income group.

15. Regressions not reported in Tables 3-5 revealed that family poverty influences black and non-black families similarly; coefficients on interaction terms involving ethnicity and family poverty were not significant. In addition, family poverty influences males and females similarly; coefficients on interaction terms involving gender and family poverty were not significant.

Table 1: Means and Standard Deviations for Variables Used in Regression Analyses

Variable	Total Sample	Nonblacks	Blacks
Family Level Background Variables			
Gender: Male = 1	0.49 (0.50)	0.51 (0.50)	0.47 (0.50)
Ethnicity: Black = 1	0.55 (0.50)	0.00 (0.00)	1.00 (0.00)
Birth Weight	1788.02 (459.32)	1843.93 (441.08)	1741.70 (469.33)
Mother's Years of Completed Education	11.81 (2.47)	12.36 (2.74)	11.35 (2.12)
Never Female Head of Household 24-60 Months	0.35 (0.48)	0.56 (0.50)	0.18 (0.38)
Female Head of Household 24-60 Months & Never Married at 60 Months	0.21 (0.40)	0.06 (0.24)	0.33 (0.47)
Female Head of Household 24-60 Months & Divorced/Widowed/Separated at 60 Months	0.07 (0.25)	0.05 (0.23)	0.08 (0.28)
Female Head of Household at 24 Months, but not at 60 Months	0.05 (0.23)	0.05 (0.22)	0.06 (0.23)
Not Female Head of Household at 24 Months, but Female Head at 60 Months	0.16 (0.37)	0.14 (0.34)	0.18 (0.39)
Other	0.11 (0.31)	0.10 (0.30)	0.11 (0.32)

Family Level Income Variables			
Average Income to Needs	1.77 (1.57)	2.52 (1.84)	1.15 (0.93)
Family Poor None of the Time	0.33 (0.47)	0.54 (0.50)	0.16 (0.36)
Family Poor Some of the Time	0.42 (0.49)	0.33 (0.47)	0.50 (0.50)
Family Poor All of the Time	0.20 (0.40)	0.08 (0.27)	0.31 (0.46)
Family Level Mediating Variables			
Home Learning Environment	21.05 (5.95)	23.60 (5.43)	18.99 (5.54)
Home Physical Environment	5.30 (1.83)	5.91 (1.62)	4.80 (1.84)
Home Warmth	5.12 (1.66)	5.62 (1.31)	4.72 (1.80)
Average Depression Score	10.68 (3.67)	11.31 (3.49)	10.15 (3.73)
Average Social Support Score	8.64 (2.19)	8.70 (1.96)	8.58 (2.37)
Active Behavioral Coping	21.62 (5.82)	22.70 (5.47)	20.73 (5.95)
Neighborhood Level Income Variables			
Fraction of Families with Incomes < $10k	0.32 (0.18)	0.24 (0.16)	0.39 (0.09)
Fraction of Families with Incomes > $30k	0.17 (0.14)	0.23 (0.16)	0.12 (0.09)

Outcome Variables			
Stanford Binet IQ Score at Age 3	87.35 (19.98)	94.05 (22.58)	81.86 (15.58)
Achenbach Internalizing Sum Score at Age 3	9.81 (5.98)	8.94 (5.82)	10.52 (6.02)
Achenbach Externalizing Sum Score at Age 3	25.41 (11.47)	23.77 (11.06)	26.76 (11.63)
WPPSI Full Scale IQ at Age 5	90.74 (17.55)	98.44 (18.43)	84.79 (14.21)
Achenbach Internalizing Sum Score at Age 5	14.16 (9.82)	14.74 (10.15)	13.65 (9.49)
Achenbach Externalizing Sum Score at Age 5	13.23 (9.40)	13.70 (10.06)	12.85 (8.82)

Source: Infant Health and Development Program

Table 2: Six-Year Family and Neighborhood Poverty Levels for White and Black Children, Ages 0-3 in 1980

	Six-Year Average Fraction of Individuals in Neighborhood Who Were Poor					TOTAL
Number of Years Family Was Poor	0-10%	10-20%	20-30%	30-40%	40%+	
White (n=796)						
None	50.6	19.5	3.1	1.0	0.0	74.2%
1-4 Years	8.6	9.2	1.8	0.4	0.3	20.2%
5-6 Years	1.6	3.0	0.9	0.1	0.0	5.6%
White Total	60.8%	31.7%	5 3%	1.4%	0.3%	100.0%
Black (n=568)						
None	4.6	12.4	12.5	2.5	1.5	33.6%
1-4 Years	1.7	7.0	10.9	5.4	2.4	27.4%
5-6 Years	3.7	13.4	13.8	3.5	4.5	39.0%
Black Total	10.1%	32.8%	37.2%	11.5%	8.4%	100.0%

Source: Panel Study of Income Dynamics

Table 3: OLS Unstandardized Regression Coefficients, Standard Errors, and Standardized Coefficients for Various Models of Effects of Family and Neighborhood Income on WPPSI Full Scale IQ at Age 5

Independent Variable:	1	2	3	4	5
Family Background Variables					
Gender: Male = 1	-1.44 (1.09) [-0.04]	-1.56 (1.05) [-0.04]	-1.64 (1.13) [-0.05]	-1.56 (1.05) [0.04]	-1.76 (0.99) [-0.05]
Ethnicity: Black = 1	-7.79* (1.30) [-0.22]	-5.44* (1.29) [-0.15]	-6.49* (1.38) [-0.18]	-4.85 (1.31) [-0.14]	-2.90* (1.26) [-0.08]
Birth Weight	0.005* (0.001) [0.13]	0.005* (0.001) [0.13]	0.005* (0.001) [0.13]	0.005* (0.001) [0.13]	0.004* (0.001) [0.12]
Mother's Years of Completed Education	2.08* (0.25) [0.29]	1.27* (0.26) [0.18]	1.77* (0.27) [0.25]	1.19* (0.26) [0.17]	0.66* (0.26) [0.09]
Never Female Head of Household 24-60 mo.	Omitted	Omitted	Omitted	Omitted	Omitted
Female Head of Household 24-60 mo. & Never Married at 60 mo.	-5.37* (1.69) [-0.12]	-2.46 (1.68) [-0.06]	-3.02 (1.84) [-0.07]	-2.60 (1.67) [-0.06]	-1.82 (1.60) [-0.04]
Female Head of Household 24-60 mo. & Divorced/Widowed/Separated at 60 mo.	-4.69* (2.33) [-0.07]	-1.13 (2.29) [-0.02]	-1.48 (2.52) [-0.02]	-1.01 (2.28) [-0.02]	1.71 (2.19) [0.02]
Female Head of Household at 24 mo. but not at 60 mo.	-3.82 (2.60) [-0.05]	-0.28 (2.54) [-0.00]	-1.01 (2.77) [-0.01]	-0.14 (2.53) [-0.00]	-0.11 (2.39) [-0.00]
Not Female Head of Household at 24 mo., but Female Head at 60 mo.	-3.48* (1.70) [-0.07]	-0.83 (1.67) [-0.02]	-2.01 (1.80) [-0.04]	-0.51 (1.66) [-0.01]	-0.19 (1.58) [-0.00]
Other	-4.87* (1.98) [0.09]	-1.82 (1.95) [-0.03]	-3.13 (2.10) [0.06]	-1.67 (1.94) [-0.03]	0.27 (1.84) [0.01]

Family Economic Status Average Income to Needs		3.57* (0.47) [0.32]		3.04* (0.50) [0.27]	2.22* (0.47) [0.20]
Family Poor None of the Time			Omitted		
Family Poor Some of the Time			-4.02* (1.62) [0.11]		
Family Poor All of the Time			-9.06* (2.10) [-0.21]		

Neighborhood Economic Status Fraction Neighbors with Incomes < $10k				0.66 (4.98) [0.01]	
Fraction Neighbors with Incomes $10-30k				Omitted	
Fraction Neighbors with Incomes > $30k				16.43* (6.82) [0.13]	
Family Mediating Variables Home Learning Environment					1.27* (0.12) [0.43]
Home Physical Environment					-0.30 (0.32) [-0.01]
Home Warmth Environment					-0.10 (0.35) [-0.01]
Average Social Support Score					-0.36 (0.25) [-0.04]
Average Depression Score					-0.10 (0.14) [-0.02]
Active Behavioral Coping					0.14 (0.09) [0.05]
Constant	64.54	63.54	68.72	61.85	50.57
Adjusted R Square	0.31	0.36	0.33	0.37	0.46
N	720	720	662	720	690

*|B/SE| > 2

Source: IHDP

Note: All regression models also include dummy variables for seven of the eight data collection sites as well as treatment status. Standardized regression coefficients (betas) are in brackets. Mean of dependent variable WPPSI Full Scale IQ is 90.74; standard deviation is 17.55.

Table 4: OLS Unstandardized Regression Coefficients, Standard Errors, and Standardized Coefficients for Various Models of Effects of Family and Neighborhood Income on Achenbach Internalizing Sum Score at Age 5

Independent Variable:	1	2	3	4	5
Family Background Variables					
Gender: Male = 1	-0.16 (0.70) [-0.01]	-0.13 (0.70) [-0.01]	-0.07 (0.73) [-0.00]	-0.13 (0.70) [-0.01]	-0.62 (0.69) [-0.03]
Ethnicity: Black = 1	-2.56* (0.83) [-0.13]	-3.18* (0.85) [-0.16]	-3.16* (0.89) [-0.16]	-3.26* (0.87) [-0.17]	-2.05* (0.88) [-0.10]
Birth Weight	-0.001 (0.001) [-0.05]	0.001 (0.001) [0.05]	0.001 (0.001) [-0.05]	-0.001 (0.001) [-0.05]	-0.001 (0.001) [0.06]
Mother's Years of Completed Education	-0.42* (0.16) [-0.11]	-0.20 (0.17) [-0.05]	-0.25 (0.18) [-0.06]	-0.20 (0.18) [-0.05]	-0.20 (0.18) [-0.05]
Never Female Head of Household 24-60 mo.	Omitted	Omitted	Omitted	Omitted	Omitted
Female Head of Household 24-60 mo. & Never Married at 60 mo.	4.29* (1.08) [0.18]	3.52* (1.11) [0.15]	3.16* (1.19) [0.13]	3.47* (1.11) [0.14]	3.04* (1.11) [0.13]
Female Head of Household 24-60 mo. & Divorced/Widowed/Separated at 60 mo.	2.85 (1.49) [0.07]	1.91 (1.51) [0.05]	1.36 (1.62) [0.04]	1.91 (1.52) [0.05]	0.79 (1.52) [0.02]
Female Head of Household at 24 mo. but not at 60 mo.	2.10 (1.66) [0.05]	1.17 (1.68) [0.03]	0.74 (1.78) [0.02]	1.18 (1.68) [0.03]	0.56 (1.66) [0.01]
Not Female Head of Household at 24 mo., but Female Head at 60 mo.	4.14* (1.08) [0.16]	3.44* (1.10) [0.13]	3.38* (1.16) [0.13]	3.45* (1.11) [0.13]	2.35* (1.10) [0.09]
Other	2.08 (1.26) [0.07]	1.28 (1.29) [0.04]	1.19 (1.35) [0.04]	1.27 (1.29) [0.04]	0.51 (1.28) [0.02]

Family Economic Status					
Average Income to Needs		-0.94* (0.31) [-0.15]		-0.97* (0.33) [-0.16]	-0.54 (0.33) [-0.09]
Family Poor None of the Time			Omitted		
Family Poor Some of the Time			2.44* (1.05) [0.12]		
Family Poor All of the Time			4.02* (1.36) [0.17]		

Neighborhood Economic Status					
Fraction Neighbors with Incomes < $10k				2.93 (3.32) [0.05]	
Fraction Neighbors with Incomes $10-30k				Omitted	
Fraction Neighbors with Incomes > $30k				3.48 (4.54) [0.05]	
Family Mediating Variables					
Home Learning Environment					-0.15 (0.09) [-0.09]
Home Physical Environment					-0.13 (0.22) [-0.02]
Home Warmth Environment					0.20 (0.24) [0.03]
Average Social Support Score					-0.24 (0.17) [-0.05]
Average Depression Score					0.72* (0.10) [0.27]
Active Behavioral Coping					0.24* (0.06) [0.14]
Constant	19.42	19.68	17.03	18.28	11.23
Adjusted R Square	0.05	0.06	0.06	0.06	0.15
N	763	760	700	760	707

*|B/SE| > 2

Source: IHDP

Note: All regression models also include dummy variables for seven of the eight data collection sites as well as treatment status. Standardized regression coefficients (betas) are in brackets. Mean of dependent variable Achenbach Internalizing Sum Score is 14.16; standard deviation is 9.82.

Table 5: OLS Unstandardized Regression Coefficients, Standard Errors, and Standardized Coefficients for Various Models of Effects of Family and Neighborhood Income on Achenbach Externalizing Sum Score at Age 5

Independent Variable:	1	2	3	4	5
Family Background Variables					
Gender: Male = 1	5.03*	5.06*	5.11*	5.07*	4.74*
	(0.64)	(0.64)	(0.67)	(0.64)	(0.64)
	[0.27]	[0.27]	[0.27]	[0.27]	[0.25]
Ethnicity: Black = 1	-1.91*	-2.54*	-2.39*	-2.83*	-2.16*
	(0.76)	(0.78)	(0.82)	(0.80)	(0.81)
	[-0.10]	[-0.13]	[-0.13]	[-0.15]	[-0.11]
Birth Weight	0.000	0.000	0.000	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]
Mother's Years of Completed Education	-0.45*	-0.23	-0.32*	-0.21	-0.11
	(0.15)	(0.16)	(0.16)	(0.16)	(0.16)
	[-0.12]	[-0.06]	[-0.09]	[-0.05]	[-0.03]
Never Female Head of Household 24-60 mo.	Omitted	Omitted	Omitted	Omitted	Omitted
Female Head of Household 24-60 mo. & Never Married at 60 mo.	2.99*	2.21*	2.10	2.13*	1.97
	(1.00)	(1.02)	(1.09)	(1.02)	(1.03)
	[0.13]	[0.10]	[0.09]	[0.09]	[0.09]
Female Head of Household 24-60 mo. & Divorced/Widowed/Separated at 60 mo.	3.18*	2.23	2.00	2.20	1.38
	(1.37)	(1.39)	(1.50)	(1.39)	(1.41)
	[0.09]	[0.06]	[0.05]	[0.06]	[0.04]
Female Head of Household at 24 mo. but not at 60 mo.	1.87	0.93	0.80	0.91	0.69
	(1.53)	(1.55)	(1.65)	(1.54)	(1.54)
	[0.05]	[0.02]	[0.02]	[0.02]	[0.02]
Not Female Head of Household at 24 mo., but Female Head at 60 mo.	4.15*	3.44*	3.57*	3.39*	2.52*
	(1.00)	(1.02)	(1.07)	(1.02)	(1.02)
	[0.16]	[0.14]	[0.14]	[0.13]	[0.10]
Other	2.33*	1.52	1.65	1.47	0.79
	(1.16)	(1.19)	(1.25)	(1.18)	(1.19)
	[0.08]	[0.05]	[0.05]	[0.05]	[0.03]

Family Economic Status Average Income to Needs		-0.96* (0.29) [-0.16]		-0.91* (0.31) [-0.15]	-0.47 (0.30) [-0.08]
Family Poor None of the Time			Omitted		
Family Poor Some of the Time			1.77 (0.97) [0.09]		
Family Poor All of the Time			3.26* (1.25) [0.14]		

Neighborhood Economic Status					
Fraction Neighbors with Incomes < $10k				6.18* (3.04) [0.12]	
Fraction Neighbors with Incomes $10-30k				Omitted	
Fraction Neighbors with Incomes > $30k				4.12 (4.17) [0.06]	
Family Mediating Variables					
Home Learning Environment					-0.20* (0.08) [-0.13]
Home Physical Environment					-0.40 (0.21) [-0.08]
Home Warmth Environment					-0.13 (0.22) [-0.00]
Average Social Support Score					0.07 (0.16) [0.02]
Average Depression Score					0.63* (0.09) [0.25]
Active Behavioral Coping					0.14* (0.06) [0.09]
Constant	13.75	14.02	11.99	11.34	7.95
Adjusted R Square	0.12	0.13	0.12	0.13	0.20
N	763	760	700	760	707

*|B/SE| > 2

Source: IHDP

Note: All regression models also include dummy variables for seven of the eight data collection sites as well as treatment status. Standardized regression coefficients (betas) are in brackets. Mean of dependent variable Achenbach Externalizing Sum Score is 13.23; standard deviation is 9.40.

Table 6: OLS Unstandardized Regression Coefficients, Standard Errors, and Standardized Coefficients for Various Models of Effects of Family and Neighborhood Income on WPPSI Full Scale IQ (Col. 1), Achenbach Internalizing (Col. 2) and Achenbach Externalizing (Col. 3) at Age 5

Independent Variable:	1	2	3
Family Background Variables			
Gender: Male = 1	5.59 (0.77) [0.02]	-0.52 (0.61) [-0.03]	4.11* (0.55) [0.22]
Ethnicity: Black = 1	-2.82* (0.93) [-0.08]	-3.10* (0.73) [-0.16]	-2.96* (0.67) [-0.16]
Birth Weight	0.002* (0.001) [0.06]	-0.001 (0.001) [-0.04]	0.000 (0.001) [-0.00]
Mother's Years of Completed Education	0.64* (0.19) [0.09]	0.12 (0.15) [0.03]	-0.02 (0.14) [-0.01]
Never Female Head of Household 36-48 mo.	Omitted	Omitted	Omitted
Female Head of Household 36 mo. but not at 48 mo.	1.77 (2.26) [0.02]	-1.25 (1.80) [-0.02]	-0.31 (1.63) [-0.01]
Not Female Head of Household 36 mo. but Female Heat at 48 mo.	0.94 (1.25) [0.02]	1.48 (1.00) [0.05]	1.94 (0.91) [0.07]
Female Head of Household at 36 and 48 mo.	-0.36 (0.98) [-0.01]	2.34* (0.78) [0.12]	1.43 (0.71) [0.07]

Family Economic Status Average Income to Needs	1.27* (0.35) [0.12]	-0.34 (0.27) [-0.06]	-0.49 (0.25) [-0.08]
Age 3 Controls Stanford Binet IQ	0.61* (0.02) [0.70]		
Achenbach Internalizing Score		0.83* (0.05) [0.51]	
Achenbach Externalizing Score			0.41* (0.02) [0.50]
Constant	22.71	7.00	1.70
Adjusted R Square	0.66	0.28	0.35
N	722	763	763

*|B/SE| > 2

Source: IHDP

Note: All regression models also include dummy variables for seven of the eight data collection sites as well as treatment status. Standardized regression coefficients (betas) are in brackets.